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400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE RECOMMENDED PRACTICE

Submitted for recognition as an American National Standard

SAE J1638

Issued 1993-05-30

COMPRESSION SET OF HOSES OR SOLID DISCS

1. **Scope**—This SAE Recommended Practice is used for establishing the compression set that could be expected to occur with engine coolant hoses under securing clamps. It seeks to reproduce the type of indentation caused by the clamps in the wall of the hose. An excessive compression set measured by this method would indicate a hose that could eventually allow leakage of coolant past the clamps in service. This method has been found to give repeatable results in the range of 25% to 50% initial compression.

2. References

2.1 **Applicable Documents**—The following publications form a part of this specification to the extent specified herein.

* 2.1.1 **ASTM PUBLICATIONS**—Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM D 3767—Practice for Rubber—Measurement of Dimensions

ASTM E 145—Specification for Gravity-Convection and Forced-Ventilation Ovens

3. Apparatus Required

3.1 **Compression Fixture**—Refer to Figures 1 through 4.

3.2 **Dial Micrometer**—For use in measuring thickness according to ASTM D 3767, Method A1. The measuring foot shall be flat with a diameter of $2.5 \text{ mm} \pm 0.1 \text{ mm}$ and a load of 45 g.

3.3 **Feeler Gages or Gage Blocks**—For setting the specified compression under the indicators.

3.4 **Air-Circulating Oven**—Conforming to ASTM E 145, Type IIA.

4. Procedure

- a. Using a suitable die, stamp out a $13 \text{ mm} \pm 0.5 \text{ mm}$ diameter disc from the wall section of the hose or test material (3 samples for each test). If the surface of the cover is irregular, it shall be lightly buffed around the test area until smooth prior to cutting sample.

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- b. Measure the thickness of each sample with the cover side down and calculate the required distance between the base plate and the bottom face of the indenter to give the specified compression value.
- c. Tighten the compression set fixture plates and, using feeler gages or gage blocks, set each indenter to give the specified compression.
- d. Release the top compression plate and insert the test samples under the preset indentors. Replace the top compression plate and tighten fully.
- e. Age the compression fixture in the oven for the specified time and temperature.
- f. Remove the fixture from the oven and allow to cool for $3 \text{ h} \pm 0.25 \text{ h}$.
- g. Remove each sample separately and measure the compressed thickness at the required time of recovery $\pm 0.1 \text{ h}$.

5. **Evaluation**—Calculate the percent compression set according to the following:

$$\% \text{ Compression Set} = \frac{A - C}{A - B} \times 100 \quad (\text{Eq.1})$$

where:

A = initial sample thickness

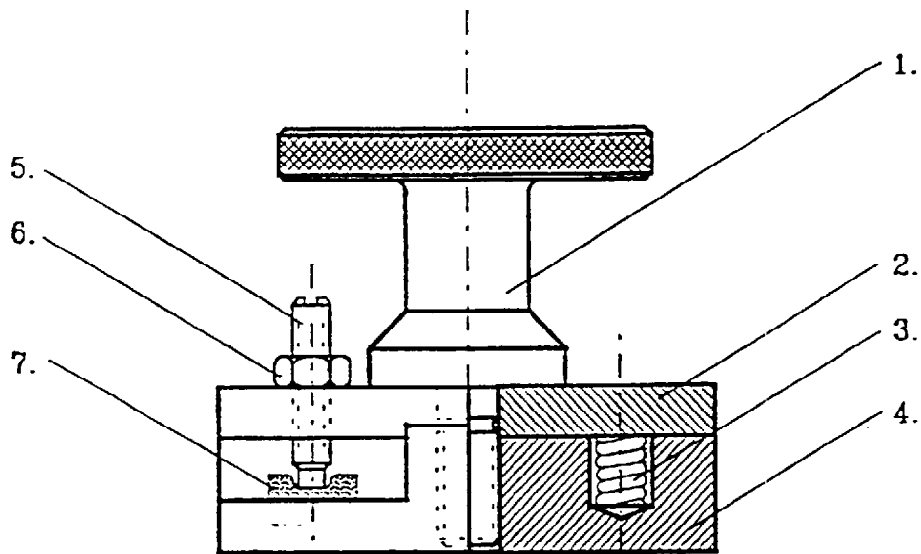
B = compressed thickness before aging

C = compressed thickness after aging after sample removal and recovery.

Chemicals, materials, parts, and equipment referenced in this document must be used and handled properly. Each party is responsible for determining proper use and handling in its facilities.

PREPARED BY THE SAE COMPRESSION SET TASK GROUP
OF THE SAE COOLANT HOSE COMMITTEE

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Sectional View of Compression Set Fixture

1. Loading Screw
2. Pressure Plate
3. Pressure Spring:
 - O.D. - 8 mm
 - I.D. - 6 mm
 - Length - 16.5 mm
 - Compressed Length - 6.5 mm
 - Compressed Force - 3.7 kg
 - Number of Turns - 5.5
4. Base Plate
5. Adjusting Screw and Indenter
6. Lock Nut - M6
7. Test Sample
8. Material: Stainless Steel
9. All dimensions in mm, +/- 0.25

FIGURE 1—SECTIONAL VIEW OF COMPRESSION SET FIXTURES